radionuclides brackets just about anything that could have happened here and clearly was more than generous in compensating for internal exposure that he might have received as a result of his hand contamination. No one contests that.

MS. MUNN: No, my perspective is that you're -- you're following your charge in your approach, yeah.

DR. H. BEHLING: Okay. I think we're done with case #6, so we're --

MR. GRIFFON: Let me -- let me --

DR. H. BEHLING: Oh --

MR. GRIFFON: This is Mark Griffon, I'm sorry. I have one more thing I (unintelligible) which is to -- it sort of overlaps with the first issue that you brought up on the dose conversion factor and the uncertainty, yeah -- that -- and -- and this -- this is a question of -- I believe this -- this individual -- obviously I don't -- I believe this individual at one point was a , and my -- I guess my question was, in there were a couple of events where he had high ring badge data --

THE COURT REPORTER: I'm sorry, he had what?

DR. H. BEHLING: High --

MR. GRIFFON: High ring badge.

THE COURT REPORTER: Thank you.

MR. GRIFFON: Sorry.

DR. H. BEHLING: Up to 5,000 millirem.

MR. GRIFFON: Right. And my -- my question was, I wasn't sure what exactly they were working with in the and whether film badge -- or -- his regular badge most likely was worn on the chest. And if you're working at your waist level, you're dealing with a (unintelligible) enhancer I think in this situation, are -- are we missing the mark with these dose conversion factors or could this dose to his lower region actually be higher than what -- what you're projecting?

DR. H. BEHLING: This is Hans Behling trying to respond to Mark's comments. I believe part of the resolution regarding the high ring badge data was resolved by comparing ring badges on the left hand and the right hand, and concluding that the higher -- the much, much higher ring dose that represented the 5,000 millirem value was a -- an aberration that is a

defective dosimeter reading. I think that's one of the conclusions they came up with. And it was strictly comparing the left hand/right hand ring data and coming to the conclusion that perhaps the high exposures that were observed were in fact due to a deficiency. I mean the rings are sometimes the -- and especially early on, they're a single chip, often -- I assume they used calcium fluoride in those days and they may very well have had an aberrant read. It's difficult to judge.

MR. GRIFFON: And in this case -- this is Mark Griffon again. In this case did -- did anyone explore what -- what kind of work might have been going on in that ? Was it plutonium work, was it uranium work, was -- was it -- do you have knowledge of that or were there surveys of the -- of that particular --

MR. HINNEFELD: Sitting here today, I don't have knowledge of that.

DR. H. BEHLING: Let me clarify this -- Hans Behling. He was a , whose job was defined in the dose reconstruction report as a person who did of in the

, which is the plutonium (unintelligible) Pilot Plant.

MR. GIBSON: This is Mark Gibson, if I could make a comment. Then isn't it also plausible that the reading on each ring was appropriate if he was --

DR. H. BEHLING: It's possible.

MR. GIBSON: -- holding in his left hand a canister and he was unloading with his right hand?

DR. H. BEHLING: Yes.

MR. GIBSON: Then depending on the way the canister was shaped, it could have -- back to Mark's point about the lower extremity exposure.

DR. H. BEHLING: I'm not -- I'm giving you the explanation as (unintelligible) --

MR. GIBSON: (Unintelligible)

DR. H. BEHLING: -- in the resolution of dosimeter data. Whether or not I agree is something I can't...

MR. GRIFFON: I guess my -- Mark Griffon again. My -- my point was, you know, for the appropriate missed -- or -- or to determine whether the film badge values are appropriate

or what kind of dose conversion you should use, especially for colon cancer, I wondered if anybody explored radiation surveys of that area and it would be interesting to see if they had surveyed points on the or, you know, where his waist might have been during -- during the work. That was my -- that was my point, and that -- and especially when you see the high ring data -- whether they -- they -- whether the contractor sort of made them go away or not, it raised a flag with me, maybe it needed further investigation and it could have been a significant -- not -- not a (unintelligible) 20 or 30 millirems (unintelligible) point here, maybe a more significant amount of dose, so that's why I -- it piqued my interest.

MR. HINNEFELD: This is Stu Hinnefeld. As a general rule we considered and a special case, and I'm not real sure about this one, so let me, if I may, do some more investigation back at the office and provide a better (unintelligible) of that as part of this -- of our position on this case. All right? Because it is a fact that we

do consider a , meaning someone whose job is to work in a , not someone who was in the room with the or -- or did once in a while on the , but someone who was a worker, we did consider that a special geometry case.

MR. GRIFFON: And -- and just a final point -- Mark Griffon again -- on that, at some point I have heard that -- that -- it might have been at Hanford -- that (unintelligible) , the -- the way they were shielded varied over time, too, so that -- you know, depending on the -- the year or the -- the situation, they might have had shielding in the front -- more or less shielding in the front, you know, in between the worker and the source (unintelligible) that might, you know --

MR. HINNEFELD: This is Stu Hinnefeld and we have in fact seen photographs of several different designs of as it relates to the shielding in front of the -- or lack thereof in front of the worker.

MS. MUNN: There were a limited number of activities that occurred in the .

You should be able to bracket them pretty well. Most of the really complex separation activities and things of that sort that went on in were not in that building.

MR. HINNEFELD: Okay. Thank you, Wanda.

MS. MUNN: You bet.

DR. H. BEHLING: Are you ready to go on to --

MR. HINNEFELD: Well, there is an issue number nine that I threw in here --

DR. H. BEHLING: Oh, okay.

MR. HINNEFELD: -- but it's a general comment that the dose reconstructions are hard to understand, and it was made on several dose reconstructions and we certainly aren't -- aren't arguing that.

MR. FITZGERALD: Let me clarify -- this is Joe. Let me clarify -- in terms of improving understanding, they also may be auditable -- more auditable or -- how do you approach that?

MR. HINNEFELD: Well, I hate to commit to what it's going to look like because I'm going to work with our contractor.

MR. FITZGERALD: I heard two is-- I heard two issues we went through last time. One was -- really wasn't much basis provided so you

couldn't understand the issue, and the other one was you almost had to reproduce the entire calculation, which is a slightly different issue, which is (unintelligible) the -- the -- lends itself to audit -- audit (unintelligible) your future review down the road in case there's any adjudications or anything like that, which is a pretty critical finding.

MR. HINNEFELD: I will say that both of the things you mentioned -- readability or understandability and ease of auditability -- are part of -- are part of the scope of what we intend to work on.

MR. FITZGERALD: Okay.

MR. HINNEFELD: I can say that. I can't make (unintelligible) like I said.

MR. FITZGERALD: Oh, sure.

MR. HINNEFELD: I can't -- I can't define what it is.

MR. FITZGERALD: Right.

MR. HINNEFELD: Now I think we're ready for case #7.

MR. GRIFFON: We're moving along.

DR. H. BEHLING: We're trying to play catch-up here.

PRESENTATION/DISCUSSION OF ISSUES FOR CASE #7

MR. HINNEFELD: Okay, the first issue, issue number one, on case #7 I understand now relates to our failure to provide the correct copy of the reference for the reviewer. So there were some sub-comments that had to do with whether this procedure six provides the right guidance or not, and once you have the correct version, the up-to-date version, I believe it does provide the guidance for -- for doing that, for the factors involved, the dose reconstruction factors involved.

There's an additional complication in this -- this dose reconstruction (unintelligible) the text of the dose reconstruction says an assumed annual X-ray was assigned for the dose reconstruction for this person. The person worked for years. So when you look at the dose reconstruction input sheet -- the IREP IMBA sheet, there are only four years of annual X-rays, so this was a mistake, an oversight. So balancing against that is we have the medical record for this Energy employee, and it indicated the person had two X-rays during their employment, so by assigning

four, you still have assigned more than what they apparently -- more medical dose than what the person apparently received.

I think I might take the opportunity here to say something that I -- I don't know if it's important to say here or not, but I want to make sure everybody understands that when we review a dose reconstruction, we quite likely would send this one on -- see this, say okay, well, that will go anyway. And we're -- we're not -- you know, as a part of our review, we're not trying right now to make the dose reconstructions perfect. If we see this mistake of a Han-- you know, probably the -- the dose is still -- the dose is still higher than the person received anyway, even though we see -- we might -- I suspect we didn't notice it because we probably would have gone back up and changed the wording of the dose reconstruction so it didn't say an annual (unintelligible). But we might have just said what the heck, it's a good dose reconstruction, it's complete, we're going to sign it and send it on.

Similarly, if we see a mistake -- there are one

or two badges -- not a whole bunch, but one or two badges where a result of four was counted as a real result instead of as a non-detect the way it should have been, we might approve that and send it on, as well.

So I want to make sure as we go through this, we're -- we're being pretty pure on the science a lot of these -- a lot of the things we're noticing, I think, which is admiral -- and admirable review to do that. But understand we are not behaving at NIOSH in the same fashion. We are knowingly approving dose reconstructions that we can see these small (unintelligible) in and sending them on to the Department of Labor. So that -- we are behaving in that fashion. Now I guess we can be told don't behave that way anymore, but we're behaving that way and we're doing it in order to get them out (unintelligible), because if we don't, if we go (unintelligible), it adds at least a week to that one dose reconstruction, which is back in -- in the line, in the crowd, waiting for everybody else's, as well. There's a big bunch of dose reconstructions to be done yet.

DR. H. BEHLING: And -- and -- this is Hans

Behling. And we agree, but on the other hand there is a certain amount of liability associated with even allowing marginal errors into the dose reconstruction report that will be received by the claimant himself, subject to his review, and even some instances there'll be clear errors here that he will identify and say well, they screwed this one up, how do I know that my internal exposure was properly calculated -- and it leads to skepticism and cynicism and distrust. And so the fewer errors, even if they're minor, that we have to introduce, the better off we'll be in terms of public relations and gaining the trust of the people.

And in behalf of this case, let me just summarize this. This issue number one, there were multiple comments. The person in -- the dose reconstructor, in his write-up, says we (unintelligible) annual doses to medical X-rays. As it turned out that there were only four, and the four in question were given 5.25 rem, that's 21 millirem in total for four individual. And then he says well, the use -- the ORAUT-PROC-0006 value on page 98, which is

a table. And I'm looking at the table, and in fact -- Kathy, can we turn that up -- you will see the numbers including years. You will see over there in column number two and you see column -- actually it's column number three, which is group two, and you see 14.2 millirem as the default organ dose value that should have been used. Which means that even for the four years to which he assigned the dose of 5.25 millirem, he should have had 14.2 millirem, and then it drops in year 1997 to 11.5 and subsequently to 7.41. Marginal numbers of course there. You're talking a few millirem. But nevertheless, if you say you used that table as a default value, group two, organ default value for assigning X-ray doses, you are still wrong, as marginal as it was. Just to clarify, Stu, can you (unintelligible)?

MR. HINNEFELD: I'm trying to figure out where we are.

DR. H. BEHLING: Yeah, we're up here and -- and (unintelligible) you have to look at the -- the period of -- of exposure. But when you see group two here, they're 14.2, 14.2, 14.2 default values for the -- for the -- and then -

-

MR. HINNEFELD: Oh, wait a minute. I understand what -- I think I know what's going on. The dose reconstructor apparently used column three. He used column three and the paragraph -- and the paragraph at the bottom where it says maximizing approach for dose reconstruction, 1.3, because that will give you five.

DR. H. BEHLING: That will give me five, yeah. But I think he should have used group two for this case.

MS. MUNN: You're really getting far off there, Hans.

UNIDENTIFIED: She can't hear you.

DR. H. BEHLING: Oh, okay, I'm sorry. We were just talking about the actual numbers that this particular document, which unfortunately we didn't even have, has as default values for medical X-rays.

MS. MUNN: I got what you were talking about but I didn't get accurate wording.

DR. H. BEHLING: Yeah, what I said that it -- even for the -- for the four entries that he gave, and he apparently may have used -- and as

Stu pointed out, he may have used group three, which -- and then applied a 1.3 uncertainty factor and entered those as 5.25 millirem each for four years. It's my estimation that he may have chosen the wrong group in that table. Again, trivial -- we're talking 14.2 millirem versus the 5.2 that he used. These are trivial, it's just an error that -- you know, if a person is aware of this, if this is his dose reconstruction, he goes over it with a fine-toothed comb, he may come to the conclusion that an error was made that didn't favor him.

MS. MUNN: I understand the concern.

MR. HINNEFELD: Well, I know in looking at the review -- after we received your review comments and looking at this case, our person who looked at it felt like column three was the right column to choose from.

DR. H. BEHLING: Was it?

MR. HINNEFELD: Right now I can't find it in front of me, the information I need to look it up. So it would depend upon the -- the cancer organ and the appropriate surrogate and what table to (unintelligible) the surrogate from.

Now -- I can't remember any of it now, but I know the guy who looked at it --

DR. H. BEHLING: Well --

MR. HINNEFELD: -- thought it was done correctly.

DR. H. BEHLING: -- it's Hodgkin's disease, and the tissue in question would have been actually in the primary field. I assume, based on the medical report, the lymph tissues that were subject to the disease were probably in the primary field, in which case even these organ tissues probably were incorrect. He probably should have used as a substitute a lung dose for the chest X-rays because that would have given him a much more accurate (unintelligible). In that instance the dose would have been probably 40-some-odd millirem, given the time frame in question. So the lymphatics that are subject to the cancerous lesion are probably in the primary beam of the X-ray.

MR. HINNEFELD: Well --

DR. H. BEHLING: So they would (unintelligible) multiple reasons for questioning --

MR. HINNEFELD: (Unintelligible) what the

problem is if that was -- okay. The instructions for lymphomas now for external target organ is the remainder category, so I am guessing the remainder -- there is a remainder category as an external -- essentially as a dose conversion factor, a remainder category which relates to (unintelligible) lymphoma, and there's some other potential doses go in there, and so the guy who read this apparently felt that the remainder -- correct column for remainder was the third column.

Now I can say that the correct target organ for lymphoma is under discussion right now.

DR. H. BEHLING: Yeah, and it should be where (unintelligible). If you have a lymph node that's a neck, it's quite different from the inguinal (unintelligible) in the thigh area, which would be outside the primary beam. So one shouldn't even look at the generic value, but say where did this lymphoma -- where is the primary lesion. If it's -- in the case of medical X-rays, if it's in the primary beam the surrogate tissue would be the lung.

MR. HINNEFELD: I think for the purposes of this report, the point is relatively moot

because it's being addressed elsewhere.

DR. H. BEHLING: Okay.

MR. HINNEFELD: But -- but this -- the dose reconstruction was done in accordance with the instructions available at the time.

Okay, issue number two on this also is to the whole lymphoma target organ question, and it questions whether (unintelligible) metabolic organ was -- was the correct target organ for -- - for lymphatic cancer for internal dose. Highest non-- I'm sorry, highest non-metabolic organ.

There is in fact a medical review done of lymphomas in the determination of our position of what target organ to select. The particular physician who's on the staff of MJW who's a health -- well, I would say he was a health physicist before going to medical school because after you've been to medical school, why would you want to be a health physicist anymore, but he's -- he's called -- you know, he's referred to as a health physicist and physician, and he provides the medical review of the target organ and he suggests the high non-metabolic and so it was done in accordance

with that. And our instructions are, on these cases, get medical review, then the medical review determines what the target organ (unintelligible).

DR. H. BEHLING: Okay.

MR. HINNEFELD: But to a certain extent the point is moot because of some of the reasons you were discussing earlier.

DR. H. BEHLING: Again, two points -- this is Hans Behling -- on this issue is that when I raised it, I did not necessary (sic) say it applied to this case.

MR. HINNEFELD: Right.

DR. H. BEHLING: But I raised it as an issue and the meaning is -- behind this is that if you use lymphatics and say that you use the highest non-metabolic organ, you may be in error if the lymphatics in question are those that are affiliated with the lung tissue, knowing that a phagocytosis and removal, a lung clearance -- frequently a large component of lung clearance, involves the lymphatics. And if the lymphatics (unintelligible) case were those involving the lung, you may have a very high concentration of radionuclides, and

therefore a non-metabolic organ as a surrogate would not do in this case.

In this case I do have to question, based on -- I'm not a physician, I have to tell you. I looked at this very carefully and I'm not convinced that these lymphatics in this case were not affiliated with the lung, because they were very -- they were right next to the lung tissue, and it's hard for me to -- to determine for sure, but we're going to talk about that off the record because this is something -- I don't want to talk on the record regarding this issue here that you mentioned. I won't go any beyond that, but --

MR. HINNEFELD: Well --

DR. H. BEHLING: -- I'm pretty sure I -- I have some comments that will be off the record for -- to talk about with Stu.

MR. HINNEFELD: Okay. There are -- I will say that there are discussions underway about target organs for lymphoma, and that I don't know where that will go, but it is an open question in general.

DR. H. BEHLING: Okay. But remind me, I do want to talk to you about --

MR. HINNEFELD: Okay.

DR. H. BEHLING: -- this point because I have some comments to make about this that I want off the record.

MR. HINNEFELD: Okay with me.

DR. H. BEHLING: Okay, issue three.

MR. HINNEFELD: All right, issue three relates to the fact that there were zeroes on the neutron report -- neutron monitoring report received from the Department of Energy. There was a neutron badge and it reported zero, and the dose reconstructor did not include a missed neutron dose component. And as we've looked at this, there were -- for the period of time in question, Hanford routinely put a neutron badge on people, whether they had a potential for neutron exposure or not. So the missed dose component is really only appropriate for people who have a realistic potential to be exposed to the radiation in question. And so there's a determination made on cases on whether this is a -- is there some potential exposure here for neutrons or is it just one of the people they hung a neutron badge on, and in this case there were a number of reasons that the dose

reconstructor felt would indicate that this person wasn't really -- wasn't exposed to neutron sources and therefore there was -- it was not necessary to include the missed neutron component. So I've provided my written -- (unintelligible) are the written reasons.

DR. H. BEHLING: Hans Behling, and in response to that, I did look at the dose reconstruction report. I looked at the CATI in the report and I looked at ORAUT-TKBS-6-6. Let me summarize what they indicate that would suggest perhaps the benefit of the doubt would be -- should be given to the claimant in behalf of missed neutron doses.

In the NIOSH dose reconstruction report it says (reading) was assigned to -- n the Those are the areas, but includes as a starter.

In the CATI report the individual in one of the pages -- for those who are familiar with the CATI report, there's a checklist of radionuclides that you can check off -- he indicated plutonium and californium among them. Again, I'm sure that some people say check them

all off, we don't know. But he did check them off, so that was issue number two.

Issue number three is ORAUT-TKBS-0006-6 section 6.3.4.5, and that's in a slide and -- and you will see -- oh, the other thing in the CATI report, he identified as ., all buildings -- or most buildings, I believe, which he has written. And so there are two things in the CATI report. He identifies the radionuclides that could have been neutron exposure and the , without identifying building, cited most buildings. And when I look at the ORAUT-TKBS-0006-6, you will find under the 300 area use of the areas where suspected neutron exposures could have occurred, and the dose reconstructor should consider neutron exposure.

So given those three elements -- that he identified a in a dose reconstruction report, he identified californium and plutonium, and he identified in the CATI report as having worked in the and, in parentheses in the CATI report, it says most buildings or most areas -- I felt that the benefit of doubt should have gone to the

claimant and that his neutron dose would have been appropriate under these circumstances. And that in his DOE dosimetry records they are zero numbers in -- in -- in the area of neutrons.

As Stu said, you know, maybe in those days they assigned a badge that was capable of measuring neutron and photons, and so people who had limited potential for exposures were always basically given the benefit of an exposure readout that said zero, when the truth is they were not exposed. But having the -- the data that I looked at -- and again, the claimant favorable when in doubt, follow the path of claimant favorability in assigning the dose, even if the probability is marginal, I felt he could have been given a neutron -- missed neutron dose and not violated the procedures as I see them.

MR. HINNEFELD: I'd like to take that under advisement and go back to the office with the (unintelligible).

DR. H. BEHLING: Okay, I think we're -- for a break, maybe (unintelligible).

I think it may be worthwhile to take a 15-

minute break, Wanda and Ray, and then we'll regroup in about 15 minutes and go on with case #7 in ten minutes -- okay, we'll go on with case #8, if that's all right with everybody.

MS. MUNN: Very good, we'll see you in half an hour -- 15 minutes. Thank you.

DR. H. BEHLING: (Unintelligible) I said ten minutes.

MS. MUNN: Ten minutes? All right, ten minutes we can do.

DR. H. BEHLING: Okay.

MS. MUNN: Thank you.

(Whereupon, a recess was taken.)

PRESENTATION/DISCUSSION OF ISSUES FOR CASE #8

DR. H. BEHLING: Everybody has come back to the table and we're ready to start with case #8, which is also from the Savannah River Site, and the person there had cancer of the esophagus. He was employed there for a very brief period of time of only months, worked at various areas at the Savannah River Site -- , et cetera -- but his job description was a . And the assigned doses are relatively modest, 2.2 rem, most of which is really a hypothetical

assignment of exposure from tritium and other radionuclides. So with that, I will turn the comments over to Stu, who will introduce issues one, and perhaps several of them because they all have a tendency to be easily taken off the table, I believe.

MR. HINNEFELD: Well, I hope so. Issue number one is a comment about missed photon dose, and it seemed to be determined in error. And that is a true comment. There was a -- a relatively small error and it actually overestimated the missed dose. There were -- apparently more zeroes were counted than were actually in the person's record, so there was a slight over-- the difference between nine zeroes and five zeroes, so it was a -- it was a real but minor and favorable error.

There are -- issue number two is I guess a similar category. The doses that are utilized for ambient exposure or environmental occupational exposure are higher than those in the Technical Basis Document. This also appears to be a real error, and again it's relatively minor and it's in favor of the claimant. In other words, the numbers in the

dose reconstruction were higher than the numbers in the Technical Basis Document. The third issue and the fourth issue are generic issues, and we're (unintelligible) about how best to deal with these today because the commenter, Joyce Lipstein*, is not with us and so we think the discussion would be probably more fruitful if she were here. We provide some discussion of our view when we get to these in case #11. I kind of will leave it to the Board members and -- I would -- I would at the very least suggest we wait till case #11, and then maybe at that time we can decide if we want to engage in some discussion now. I think we'll have to have the expectation that there will be a -- if we discuss it now or not, there will be additional following discussions, whether we discuss it today or not to -- in order to -- for the people who -- Joyce Lipstein, who actually prepared the comment, and Tom or someone on our staff to engage in discussion about the various views of it.

MR. GRIFFON: I -- Mark Griffon, and I think we should discuss it, at least (unintelligible) or tomorrow morning, whenever we get to that.

MR. HINNEFELD: Okay. I would like to suggest that we do that in case #11 because we've written some discussion in case #11.

So that takes us to issue number five, which is a comment about the extent to which information presented in the claimant's interview is addressed in the dose reconstruction. And some of these -- two of these items are disconnects between what the claimant said in the interview and the DOE record -- or actually one's a disconnect and then one's just a -- DOE didn't provide something.

In the first case, the claimant says that he participated in in vitro monitoring program. In other words, left urine samples or something like that, but the Department of Energy didn't provide any records of bioassay results when they responded -- in the person's exposure record.

The second comment was that the claimant says that he was required to have medical X-rays and the claim-- the comment here is the DOE record did not indicate any X-rays. And in point of fact, the DOE sites in general do not give us the medical X-ray records with the response.

Hanford tends to. Not all the sites tend to do that, though. So it's not unusual for us to have a DOE response that doesn't include a medical record or medical file. And in those circumstances we reconstruct with a presumed annual X-ray, and that was done in this case, as well. So the absence of a medical record we don't think is particularly damaging to the dose reconstruction here. We felt like we were -- by assuming an annual X-ray, we -- we have proceeded appropriately.

And then the third CATI comment or interview comment was this interview (sic) claimed that he was involved in spill cleanups and had to be scrubbed down several times. And I don't know that this was specifically addressed in the dose reconstruction report, but for this dose reconstruction the Energy employee's internal dose was reconstructed using the Savannah River overestimating internal approach, which is described in TIB-1, Technical Information Bulletin 1, which we often refer to as the Savannah River high five. So we -- the dose reconstruction contains quite a large component of internal dose from this intentional